



Accreditation#  
98218

12/31/19

## **CDW Consultants, Inc.**

**MicroVision Labs Coal Ash Report, Job Number: 13409**

**CDW Consultants, Inc. Project Number: 1830**

**CDW Consultants, Inc. Project Name: Beaver St**

### **Scope of Work:**

This report covers the methods and findings of the Coal/Coal Ash analysis that MicroVision Laboratories, Inc. conducted on Three (3) soil samples submitted for testing from the Beaver St project, number 1830. The purpose of this analysis was to detect and document any coal, coal ash, wood ash or asphalt that may be present in the submitted soil samples by use of a combination of microscopy techniques including SEM/EDS, PLM, and macroscopic inspection.

### **Methods:**

MicroVision Labs is accredited to the ISO/IEC 17025:2017 standard. This analysis follows our in house SOP #MVL05 (Microscopic Analysis for Coal, Coal Ash and Wood Ash). This method is listed on our certificate of accreditation and has been validated.

### **Findings:**

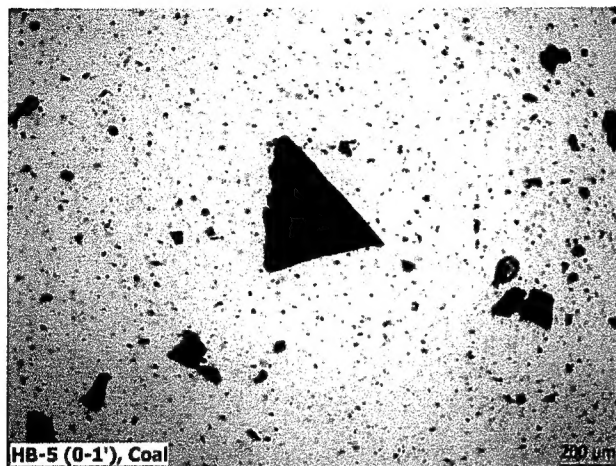
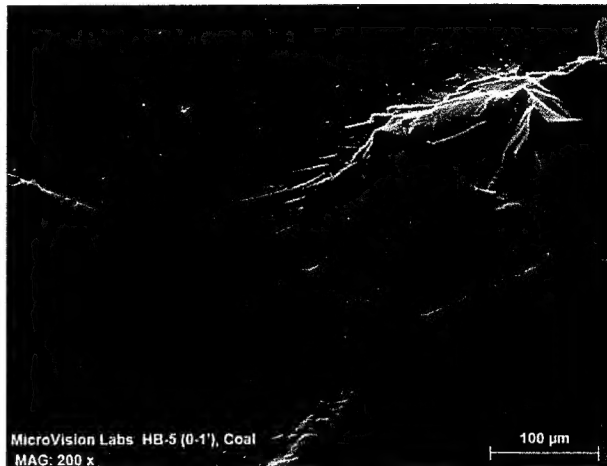
The following pages display the data for each particle type detected in the samples for this project. Each page contains a PLM image, SEM image, and EDS spectrum for the particle types detected for these samples as well as particle type descriptions and observations.

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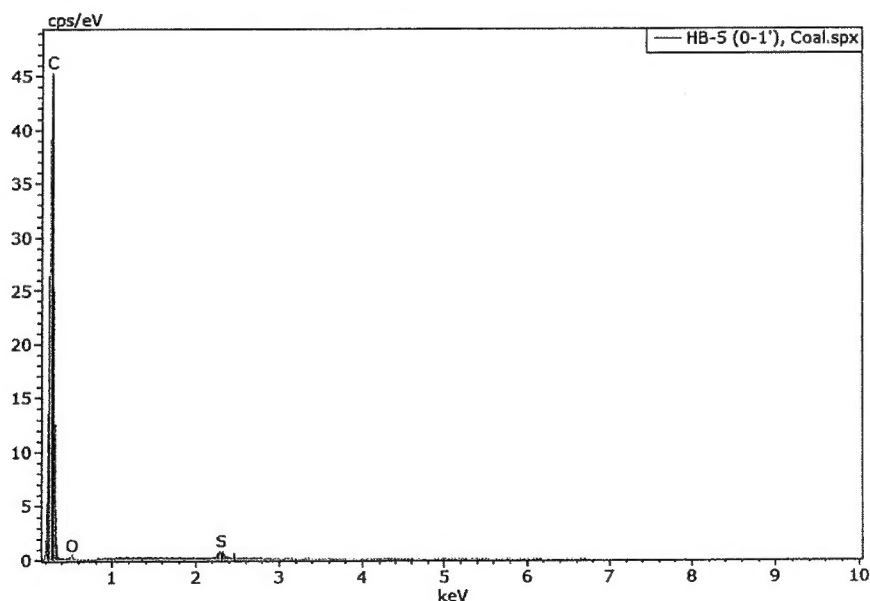
MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824  
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com  
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**Sample: HB-5 (0-1')****Number of Suspect Particle Types: Three (3)**

**Coal:** This particle type consisted of eleven (11) shiny, black grains approximately 1-3mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

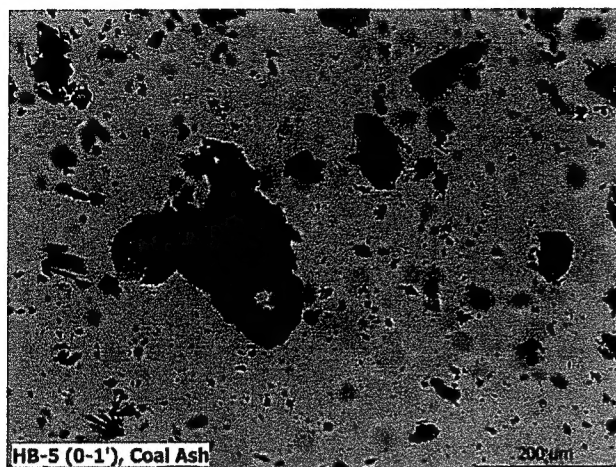
**PLM Image****SEM Image**

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen and sulfur.

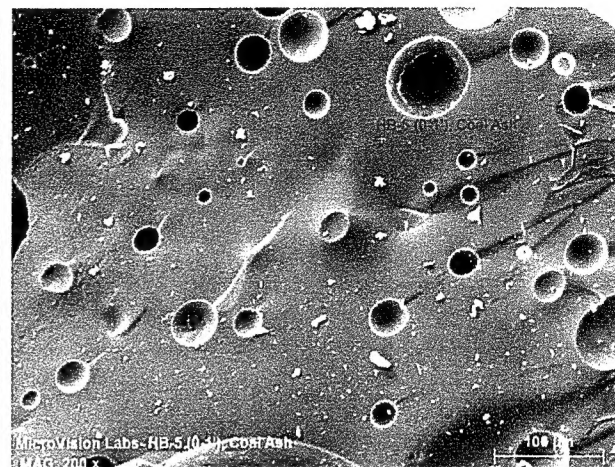
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**Coal Ash:** This particle type consisted of four (4) dark, porous grains approximately 1-3mm in diameter. The PLM examination indicated this particle type to be consistent with coal ash. The PLM and SEM images show the spherical gas voids that formed during combustion.

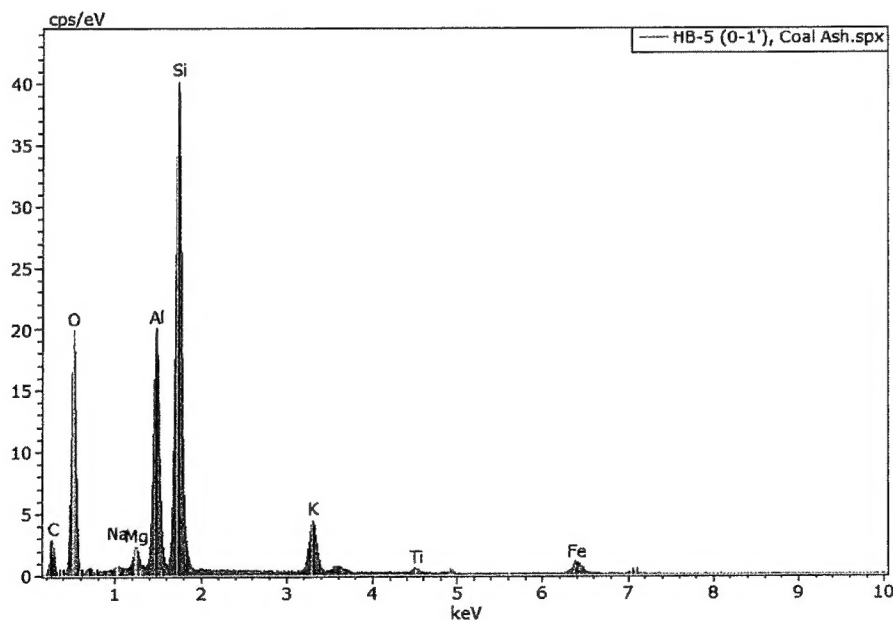


**PLM Image**



**SEM Image**

The EDS spectrum, shown below, indicates this particle type is coal ash. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, potassium, titanium and iron.



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**Wood Ash:** This particle type consisted of two (2) friable, black grains approximately 2mm in length. The PLM examination indicated this particle type to be consistent with wood ash. The PLM and SEM photos show the cellular structure typical of wood still present in these grains.

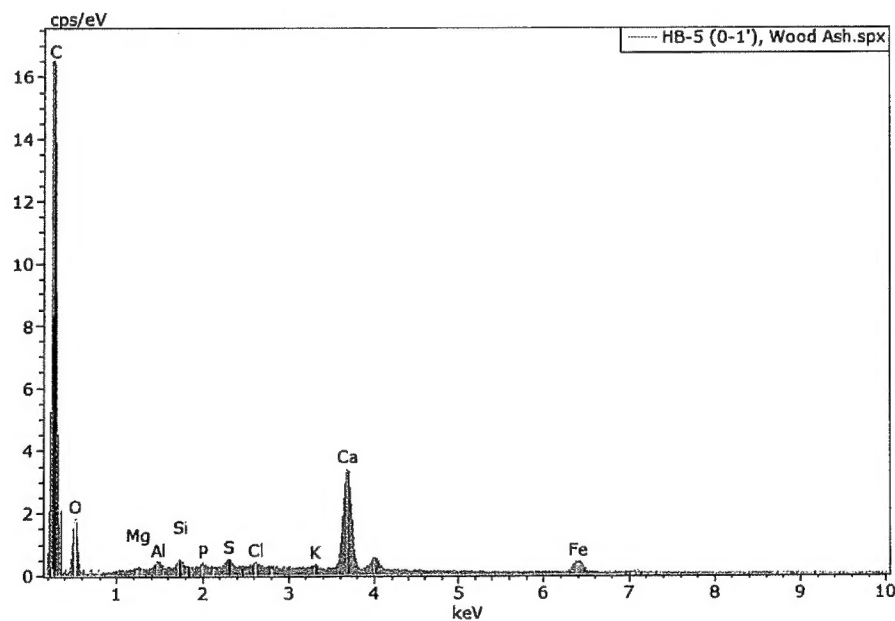


PLM Image



SEM Image

The EDS spectrum, shown below, indicates this particle type is wood ash. The analysis for this particle shows concentrations of carbon, oxygen, magnesium, aluminum, silicon, phosphorus, sulfur, chlorine, potassium, calcium and iron.

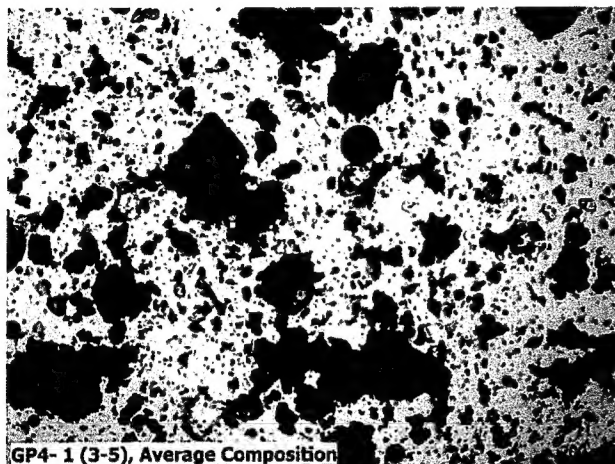
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## Sample: GP4-1 (3-5)

**No coal, coal ash, wood ash, or asphalt particles were detected in this sample.**

**Minerals:** This particle type consisted of over one hundred (100+) shiny, dark grains 1-10mm in diameter. The PLM examination indicated this particle type to be consistent with mineral matter. The PLM and SEM images of this particle type are shown below.

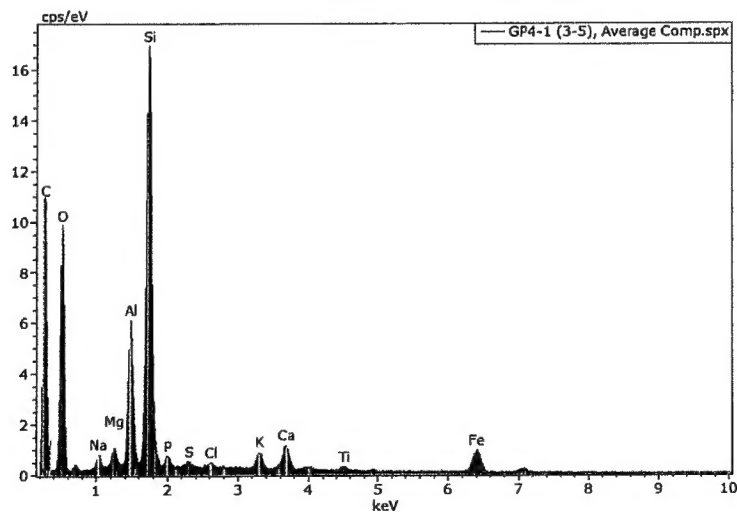


PLM Image



SEM Image

The EDS spectrum results, shown below, indicate this particle type is minerals. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, phosphorus, sulfur, chlorine, potassium, calcium, titanium and iron.



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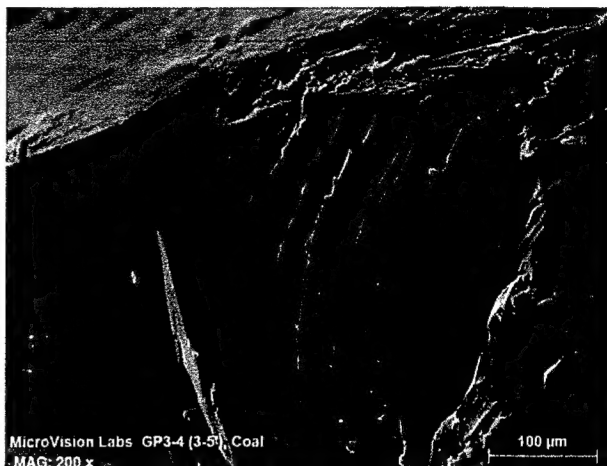
## Sample: GP3-4 (3-5')

### Number of Suspect Particle Types: Two (2)

**Coal:** This particle type consisted of six (6) shiny, black grains approximately 1-3mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

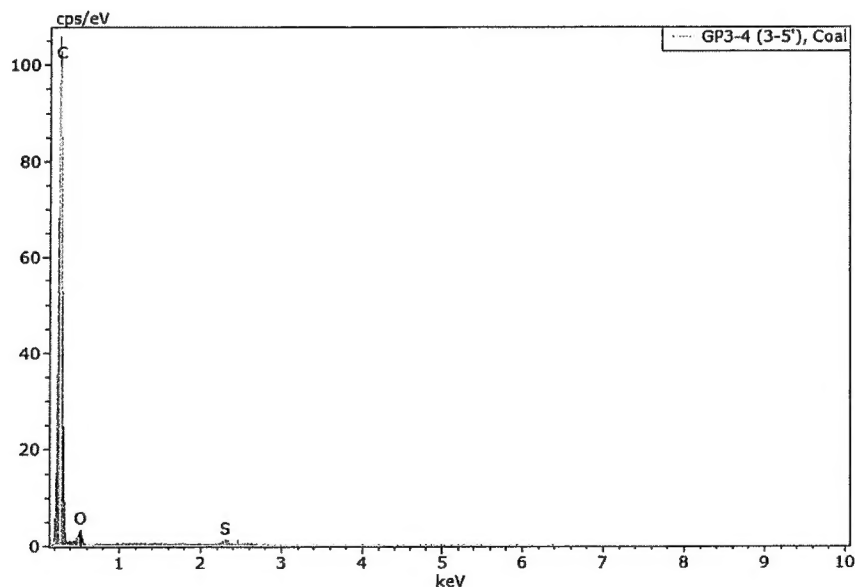


PLM Image



SEM Image

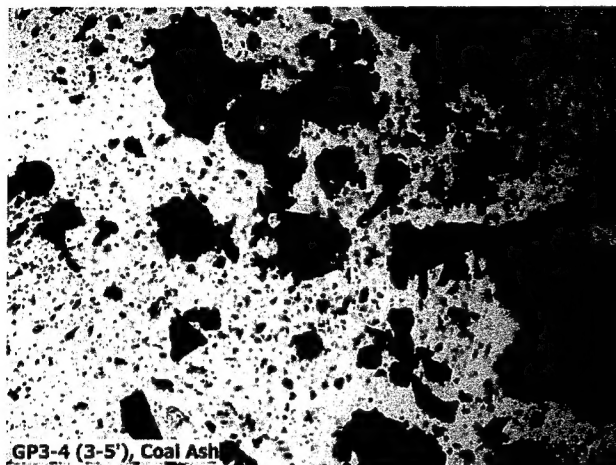
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen and sulfur.



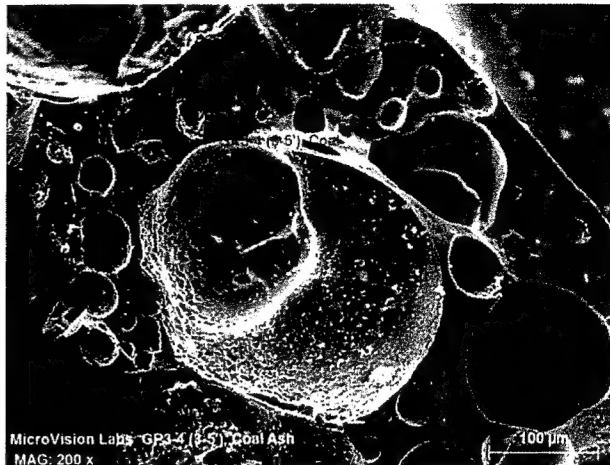
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**Coal Ash:** This particle type consisted of two (2) dark, porous grains approximately 2-4mm in diameter. The PLM examination indicated this particle type to be consistent with coal ash. The PLM and SEM images show the spherical gas voids that formed during combustion.

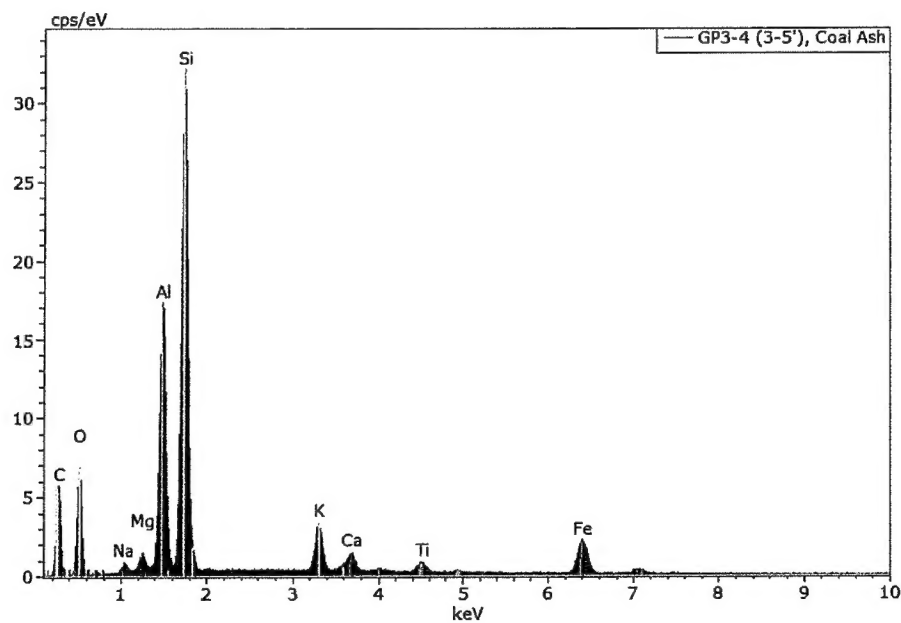


PLM Image



SEM Image

The EDS spectrum, shown below, indicates this particle type is coal ash. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, potassium, calcium, titanium and iron.

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**Results Summary Table:**

Sample Name	Material Detected
HB-5 (0-1')	Coal (light), Coal Ash (trace), Wood Ash (trace)
GP4-1 (3-5)	Minerals (heavy)
GP3-4 (3-5')	Coal (light), Coal Ash (trace)

The concentrations of the particle types detected in these samples are listed in parenthesis in the table above and are based on the number of particles found and the relative difficulty in finding them. The concentration information is listed for informational purposes only and has no bearing on exemption status.

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,



Alexander Cloonan  
Analytical Microscopist

Reviewed by: AAC

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MICROVISION LABORATORIES, INC.			Chain of Custody				MicroVision Labs Job#: 3409							
Client Information			Project Information											
Client: CDR Consultants, Inc.			Project Name: REAR 45											
Billing Address: 6 Hudson Dr., North Attleboro, MA			Project Location: REAR 45, 1000											
Phone: 508-576-2647			Project Number: 1836											
Fax:			Project Manager: A. Sundqvist											
Email: ASundqvist@cdrconsultants.com			PO#:											
Sample ID	Collected Date	Sampler's Initials	Coal Ash Test	Lead Paint	SEM/EDS	PLM/Light Microscopy	Soot ID	Dust ID	Unknown Mat'l ID	FTIR	Polished Cross Section	Particle Size Analysis	Wildfire	Other
1) HQ-5 (0-1')	11/19/19	AMS	X											
2) GP4-1 (3-5')	12/10/19	AMS	X											
3) GP3-4 (3-5')	12/10/19	AMS	X											
4)														
5)														
6)														
7)														
8)														
9)														
10)														
11)														
12)														
Relinquished By: [Signature]			Date/Time Received By: [Signature]			Date/Time			Turn Around Time and Notes:					
Hazardous Contaminants: YES / NO			If Yes, please list:											
Analytical Report Requested: YES / NO														

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